

- (C) research the history and cultural distinctions of 3D modeling, sculpture, and 3D animation in society and as an art form;
 - (D) select and research career and vocational choices in 3D modeling and animation;
 - (E) use the Internet and retrieve information in electronic formats including text, audio, video, and graphics, citing the source;
 - (F) demonstrate the appropriate use of 3D objects, digital imaging, video integration, and sound retrieved from an electronic format;
 - (G) import sounds from a variety of sources such as, audio CD, tape, digital audio, and microphone; and
 - (H) creates planning designs such, as rough sketches, storyboards, and brainstorming materials.
- (4) Critical Thinking, Problem Solving, and Decision Making. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. The student is expected to:
- (A) distinguish between and utilize the components of 3D animation software programs including cast, score, environment, the X Y Z coordinate system and the animation manipulation interface;
 - (B) distinguish and use the different 3D modeling techniques including box modeling, transformation, and polygon primitives utilizing extrusion and rotation;
 - (C) distinguish and use the different 3D animation techniques including path and rendering utilizing dynamics and physics;
 - (D) combine graphics, 3D models/objects, images, and sound for foundation or enrichment curricular projects;
 - (E) use repetition of color, shape, texture, spatial relationships, line thickness, and size to develop organization and strengthen the cohesiveness of a product;
 - (F) create three-dimensional effects by layering images using foreground, middle distance, and background images;
 - (G) apply a variety of color schemes to digital designs including monochromatic, analogous, complementary, primary/secondary triads, cool/warm colors, and split complements;
 - (H) use the basic concepts of color and design theory to construct 3D models and environments, characters, objects, and other cast members as needed for the animation;
 - (I) use the appropriate rendering techniques to create an animation or movie;
 - (J) evaluate data by using criteria appropriate for the purpose;
 - (K) resolve information conflicts and validate information through accessing, researching, and comparing data;
 - (L) use a variety of lighting techniques including shadow, shading, point, spot, directional, and ambient to create an effect; and
 - (M) define the design attributes and requirements of a 3D animation project.

- (5) Digital Citizenship. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. The student is expected to:
- (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, attributing ideas and citing sources using established methods; including evaluating the validity and reliability of sources
 - (B) define plagiarism and model respect of intellectual property when manipulating, morphing, and 3D graphics, video, text, and sound; and
 - (C) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet.
- (6) Technology Operations and Concepts. Students demonstrate a sound understanding of technology concepts, systems, and operations. The student is expected to:
- (A) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components;
 - (B) make decisions regarding the selection, acquisition, and use of software and Internet resources as taking under consideration its quality, appropriateness, effectiveness, and efficiency;
 - (C) delineate and make necessary adjustments regarding compatibility issues, digital file formats, importing and exporting data and cross platform connectivity;
 - (D) integrate the productivity tools including, but not limited to, word processor, draw, paint, imaging, animation, audio, and utility programs into 3D modeling; and
 - (E) read, use, and develop technical documentation.

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§126.33. Independent Study in ~~Technology Applications~~ Collaborative Environments in Global Technology (One-Half to One Credit).

(a) General requirements. The prerequisite for this course is completion of a high school technology applications course as identified in this subchapter and permission of the instructor/mentor for Independent Study in Technology Applications. This course may be taken at ~~Grades 10-12~~ 9-12.

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(b) Introduction.

(1) The technology applications curriculum has ~~four strands:~~ six strands: creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving, and decision making, digital citizenship, technology operations and concepts foundations, information acquisition, work in solving problems, and communication.

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(2) Through the study of ~~technology applications foundations, including technology-related terms, concepts, and data input strategies,~~ Collaborative environments in global technology, including technology-related terms, concepts, and data input strategies; students will realize the competitive advantages of group and personal collaboration. These environments combine the best features of web-based conferencing and collaboration, desktop videoconferencing, and instant messaging into a user friendly intuitive environment; students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

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(c) Knowledge and skills.

(1) Creativity and innovation. Collaborative environments in global technology. The student demonstrates an in-depth working, understanding of :

- (A) collaborative software;
- (B) workflow systems;
- (C) documentation management systems;
- (D) peer-to-peer collaboration software;
- (E) knowledge management systems;
- (F) social network systems;

~~(G)(1) Foundations. The student demonstrates~~ knowledge and appropriate use of hardware components, software programs, and their connections; ~~The student is expected to:~~

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- ~~(H)(A)~~ demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components;
- ~~(I)(B)~~ make decisions regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency;
- ~~(J)(C)~~ delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; and

- (K)(D) use appropriate technology terminology ~~in the independent study course for collaborative environments in global technology.~~
- (2) **Creativity and innovation Foundations.** In collaborative environments in global technology, the student uses data input skills appropriate to the task. The student is expected to:
- (A) demonstrate proficiency in the use of a variety of electronic input devices ~~such as including the~~ mouse, keyboard, scanner, voice/sound recorder, disk/disc, video, mobile devices, digital camera and emerging technologies, as appropriate; and
 - (B) use digital keyboarding standards for data input such as one space after punctuation, the use of em/en dashes, and smart quotation marks.
- (3) **Digital Citizenship Foundations.** The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:
- (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods;
 - (B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet;
 - (C) model respect of intellectual property when manipulating, morphing, or editing graphics, video, text, and sound.
 - (D) advocate and practice safe, legal, and responsible use of collaborative environments in global technology;
 - (E) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and
 - (F) develop and maintain a technical documentation library.
- (4) Information acquisition. The student uses a variety of strategies to acquire information from ~~electronic various~~ resources, with appropriate supervision. The student is expected to:
- ~~(A) use local area networks (LANs) and wide area networks (WANs), including the Internet and intranet, in research and resource sharing;~~
 - (A) combine digital and physical worlds within collaborative environments;
 - ~~(B) apply appropriate search strategies in the acquisition of information from the Internet including keyword and Boolean search strategies; and~~
 - (B) combine digital and physical worlds within in smart rooms; and
 - ~~(C) pose hypotheses/questions related to a selected problem.~~
 - (C) combine digital and physical worlds within real-world information.
- (5) Information acquisition. The student ~~acquires~~ utilizes content development systems that can be manipulated and analyzed ~~electronic information~~ in a variety of formats, with appropriate supervision. The student is expected to:
- (A) acquire information using appropriate research strategies and a variety of electronic formats, including Interactive components, text, audio, video, and graphics, citing the source; and simulations; and
 - (B) identify, create, and use available file formats including but not limited to text, image, video (analog and digital), and audio files.

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- (6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:
- (A) identify and employ a method to evaluate the design, functionality, and accuracy of the accessed information; and
 - (B) analyze information for validity and relevance in the confirmation, testing, and solution of the hypotheses and questions.
- (7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:
- (A) develop and apply advanced ~~technology applications skills~~ collaborative environment skills in global technology;
 - (B) identify and solve problems, individually and with input from peers and professionals, utilizing research methods and advanced ~~technology applications skills~~ collaborative environment skills in global technology used in a selected profession or discipline;
 - (C) select and integrate appropriate productivity tools including, but not limited to, word processor, database, spreadsheet, telecommunication, draw, paint, and utility programs into the creation of products;
 - (D) using ~~foundation and enrichment~~ enriched mobility hierarchies curricular content in the creation of products;
 - (E) synthesize and generate new information from data gathered from electronic and telecommunications resources;
 - (F) write simple technical documentation relative to the audience; and
 - (G) ~~(F)~~ read and use technical documentation.
- (8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (A) collaborate ~~work~~ with a mentor to determine a problem to be solved, hypotheses, and strategies to accomplish task;
 - (B) develop products that meet standards identified by the selected profession or discipline;
 - (C) produce original work to solve the identified problem and publish the product in electronic media and print;
 - (D) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor; and
 - (E) participate in relevant, meaningful activities in the larger community and society to create electronic projects.
- (9) Solving problems. The student uses technology applications to facilitate evaluation of collaborative environments in global technology system(s) work, both process and product. The student is expected to:
- (A) design and implement procedures to track trends, set timelines, review/evaluate progress for continual improvement in process and product, and publication;

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- (12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to:
- (A) design and implement procedures to track trends, set timelines, and review and evaluate the product using technology tools such as database managers, daily/monthly planners, and project management tools;
 - (B) determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience, demonstrating that process and product can be evaluated using established criteria or rubrics;
 - (C) seek and respond to input from peers and professionals in evaluating the product; and
 - (D) make necessary revisions and/or proceed to the next stage of study.

(13) Digital Citizenship. The student is expected to:

- (A) advocate and practice safe, legal, and responsible use of information and technology;
- (B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and
- (C) develop and maintain a technical documentation library in a variety of formats.

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§126.30. Independent Study in ~~Technology Applications~~ Geographic Information System (One-half to One Credit).

(a) General requirements. The prerequisite for this course is completion of a high school technology applications course as identified in this subchapter and permission of the instructor/mentor for Independent Study in Technology Applications. This course may be taken at Grades ~~10-12~~ 9-12.

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(b) Introduction.

(1) The technology applications curriculum has ~~four strands:~~ six strands: creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving, and decision making, digital citizenship, technology operations and concepts ~~foundations, information acquisition, work in solving problems, and communication.~~

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(2) Through the study of ~~technology applications~~ creativity and innovation, geographic information system, including technology-related terms, concepts, and data input strategies; students learn to make informed decisions ~~about technologies and their applications.~~ Geographic information system (GIS) is the integration of hardware and software data for capturing, managing, analyzing, and displaying geographically referenced information. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

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(c) Knowledge and skills.

(1) Creativity and innovation. Geographic information system. The student demonstrates an in-depth working, understanding of GIS core fundamentals. The student is expected to:

(A) hands on practical labs;

(B) group project work;

(C) critical assessment and evaluation of case studies;

(D) GIS analysis;

(F) data models;

(G) problem solving considerations in the context of a GIS working environment innovative use of technology;

~~(H)(I) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to:~~

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~~(I)(A)~~ demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components;

~~(J)(B)~~ make decisions regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency;

- (K) ~~(C)~~ delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity; and
- (L) ~~(D)~~ use appropriate technology terminology ~~in the independent study course for the geographic information system.~~
- (2) GIS Foundations. the student uses data input skills appropriate to the task. The student is expected to:
- (A) demonstrate proficiency in the use of a variety of electronic input devices such as the mouse, keyboard, scanner, voice/sound recorder, disk/disc, video, mobile devices, digital camera and emerging technologies, as appropriate.
 - (B) use digital keyboarding standards for data input such as one space after punctuation, the use of em/en dashes, and smart quotation marks.
- (3) Digital Citizenship Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:
- (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods;
 - (B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and
 - (C) model respect of intellectual property when manipulating, morphing, or editing graphics, video, text, and sound.
- (D) demonstrate best practices in understanding and applying Information Security.
- (E) advocate and practice safe, legal, and responsible use of information and technology.
- (F) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the internet and intranet
- (G) develop and maintain a technical documentation library.
- (4) Information acquisition. The student uses a variety of strategies to acquire information from ~~electronic~~ various resources, with appropriate supervision. The student is expected to:
- ~~(A) use local area networks (LANs) and wide area networks (WANs), including the Internet and intranet, in research and resource sharing~~
 - (A) collect geographic data;
 - ~~(B) apply appropriate search strategies in the acquisition of information from the Internet including keyword and Boolean search strategies; and~~
 - (B) represent geographic information systems;
 - ~~(C) pose hypotheses/questions related to a selected problem.~~
 - (C) store geographic data;
 - (D) visualize geographic data;
 - (E) analyze geographic data;
 - (F) use and present the geographic data; and

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- (G)(E) pose hypotheses/questions related to a selected problem.
- (5) Information acquisition. The student acquires spatial data such as coordinates and topology that can be manipulated and analyzed ~~electronic information~~ in a variety of formats, with appropriate supervision. The student is expected to:
- (A) acquire information using appropriate research strategies and a variety of electronic formats, including text, audio, video, and graphics, citing the source; and
 - (B) identify, create, and use available file formats including text, image, video (analog and digital), emerging technologies and audio files;
- (6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:
- (A) identify and employ a method to evaluate the design, functionality, and accuracy of the accessed information; and
 - (B) analyze information for validity and relevance in the confirmation, testing, and solution of the hypotheses and questions.
- (7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:
- (A) develop and apply advanced ~~technology applications~~ skills used in GIS;
 - (B) identify and solve problems, individually and with input from peers and professionals, utilizing research methods and advanced ~~technology applications~~ skills GIS skills used in a selected profession or discipline;
 - (C) select and integrate appropriate productivity tools including, but not limited to, word processor, database, spreadsheet, telecommunication, multimedia tools, and utility programs into the creation of products;
 - (D) use ~~foundation and enrichment~~ enriched curricular content in the creation of products;
 - (E) synthesize and generate new information from data gathered from electronic and telecommunications resources; and
- (F) write simple technical documentation relative to the audience; and
- (E)(G) read and use technical documentation.
- (8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (A) ~~work~~ collaborate with a mentor to determine a problem to be solved, hypotheses, and strategies to accomplish task;
 - (B) develop products that meet standards identified by the selected profession or discipline;
 - (C) produce original work to solve the identified problem and publish the product in electronic media and print;
 - (D) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor; and

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- (E) participate in relevant, meaningful activities in the larger community and society to create electronic projects.
- (9) Solving problems. The student uses technology applications to facilitate evaluation of GIS work, both process and product. The student is expected to:
 - (A) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product;
 - (B) produce documentation to illustrate the progress of the project including, journals, ~~logs~~, blogs, wikis, videos, pictorial documentation, multimedia products, ~~and~~ printed books and GIS technologies; and
 - (C) seek and respond to input from peers and professionals in delineating technological tasks and problem solving.
- (10) Communication and Collaboration ~~Communication~~. The student formats digital information for appropriate and effective communication. The student is expected to:
 - (A) format the developed projects according to defined output specifications including target audience and viewing environment; and
 - (B) present findings to a panel for comment and professional response.
- (11) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to:
 - (A) determine and implement the best method of presenting or publishing findings;
 - (B) synthesize and publish information in a variety of ways including, printed copy, monitor display, Internet documents, blogs, wikis, emerging technologies and video;
 - (C) use LANs, WANs, emerging technologies and remote resources to exchange and publish information; and
 - (D) develop cultural understanding and global awareness by engaging with learners of other cultures.
- (12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to:
 - (A) design and implement procedures to track trends, set timelines, and review and evaluate the product using technology tools such as database managers, daily/monthly planners, and project management tools;
 - (B) determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience, demonstrating that process and product can be evaluated using established criteria or rubrics;
 - (C) seek and respond to input from peers and professionals in evaluating the product; and
 - (D) make necessary revisions and/or proceed to the next stage of study.

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§126.31. Independent Study in ~~Technology Applications~~ Online Course Development (One-half or One Credit).

(a) General requirements. The prerequisite for this course is completion of a high school technology applications course as identified in this subchapter and permission of the instructor/mentor for Independent Study in Technology Applications. This course may be taken at Grades ~~10-12~~ 9-12.

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(b) Introduction.

(1) The technology applications curriculum has ~~four strands: six strands: creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving, and decision making, digital citizenship, technology operations and concepts~~ creativity and innovation, information acquisition, work in solving problems, and communication.

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(2) Through the study of ~~technology applications creativity and innovation, online course development~~, including technology-related terms, concepts, and data input strategies; students learn to make informed decisions ~~about technologies and their applications~~. Online course development is the integration of hardware and software for the creation of rich engaging content. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.

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(c) Knowledge and skills.

(1) Creativity and Innovation. The student demonstrates an in-depth working understanding of online course design fundamentals. The student is expected to:

- (A) determine appropriate e-learning content based on state or national standards;
- (B) manage course structure, modules, lessons and topics;
- (C) preview and evaluate e-learning content; and
- (D) publish e-learning content in a variety of formats.

(2)(12) Communication and Collaboration Solving Problems. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to:

- (A) design and implement procedures to track trends, set timelines, and review and evaluate the product using technology tools such as database managers, daily/monthly planners, and project management tools;
- (B) determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience, demonstrating that process and product can be evaluated using established criteria or rubrics;
- (C) seek and respond to input from peers and professionals in evaluating the product; and
- (D) make necessary revisions and/or proceed to the next stage of study.

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~~(3)~~(4) **Communication and Collaboration.** The student uses digital media to communicate and work collaboratively as part of an electronic community and as a learner, initiator and contributor. ~~Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections.~~ The student is expected to:

- (A) demonstrate knowledge and appropriate use of ~~operating systems, hardware components,~~ software ~~applications programs,~~ and ~~communication and networking components~~ their connections to online course ~~development~~;
- (B) demonstrate knowledge and appropriate use of operating systems, software applications, communication and networking components;
- ~~(C)~~(B) make decisions regarding the selection, acquisition, and use of software, taking under consideration its quality, appropriateness, effectiveness, and efficiency;
- (D) delineate and make necessary adjustments regarding compatibility issues including, ~~but not limited to,~~ digital file formats and cross platform connectivity; and
- (E) use appropriate technology terminology ~~in the independent study course for online course development~~.

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~~(4)~~(5) **Research and Information Fluency Information Acquisition.** The student ~~acquires utilizes content delivery systems that can be manipulated and analyzed~~ ~~electronic information~~ in a variety of formats, with appropriate supervision. The student is expected to:

- (A) acquire information using appropriate research strategies and a variety of electronic formats, including Interactive components, text, audio, video, and graphics, citing the source, ~~and simulations~~; and
- (B) identify, create, and use available file formats including ~~but not limited to~~ text, image, video (analog and digital), and audio ~~files~~.

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~~(5)~~(6) **Research and Information Fluency Information Acquisition.** The student evaluates the acquired electronic information. The student is expected to:

- (A) identify and employ a method to evaluate the design, functionality, and accuracy of the accessed information; and
- (B) analyze information for validity and relevance in the confirmation, testing, and solution of the hypotheses and questions.

(6) **Critical Thinking, Problem Solving and Decision Making** The student uses a variety of strategies to acquire information from a variety of resources- to design an online course based on state or national content standards. The student is expected to:

- (A) design a simple lesson based on state or national content standards ~~and~~
- (B) create a scope and sequence for content delivery ~~and~~
- (C) implement and evaluate the simple lesson using peer and mentor ~~review~~; ~~and~~
- (D) revise the lesson based upon evaluator ~~input~~.

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(7) **Critical Thinking, Problem Solving and Decision Making Solving Problems.** The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:

- (A) develop and apply advanced ~~technology applications skills;~~ content development system(s);
 - (B) identify and solve problems, individually and with input from peers and professionals, utilizing research methods and advanced ~~technology applications skills~~ content development system(s); used in a selected profession or discipline;
 - (C) select and integrate appropriate productivity tools including, but not limited to, word processor, database, spreadsheet, telecommunication, multimedia tools, and utility programs into the creation of products;
 - (D) using ~~foundation and enrichment~~ enriched curricular content in the creation of products;
 - (E) synthesize and generate new information from data gathered from electronic and telecommunications resources; and
 - (F) write simple technical documentation relative to the audience; and
 - ~~(G)(F)~~ read and use technical documentation.
- (8) Critical Thinking, Problem Solving and Decision Making ~~Solving Problems~~. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (A) work with a mentor to determine problem to be solved, hypotheses, and strategies to accomplish task;
 - (B) develop products that meet standards identified by the selected profession or discipline;
 - (C) produce original work to solve the identified problem and publish the product in electronic media and print;
 - (D) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor; and
 - (E) participate in relevant, meaningful activities in the larger community and society to create electronic projects.
- (9) Critical Thinking, Problem Solving and Decision Making ~~Solving Problems~~. The student uses technology applications to facilitate evaluation of content development system (s) work, both process and product. The student is expected to:
- (A) design and implement procedures to track trends, set timelines, review/evaluate progress for continual improvement in process and product, and publication;
 - (B) produce documentation to illustrate the progress of the project including, but not limited to journals, ~~logs, blogs, wikis,~~ videos, pictorial documentation, multimedia products, and printed books; and
 - (C) seek and respond to input from peers and professionals in delineating technological tasks and problem solving.
- ~~(10)(3)~~ Digital Citizenship Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:
- (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods;

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- (B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet;
- (C) model respect of intellectual property when manipulating, morphing, or editing graphics, video, text, and sound;
- (D) demonstrate best practices in understanding and applying Information Security;
- (E) advocate and practice safe, legal, and responsible use of online course development;
- (F) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet;
- (G) develop and maintain a technical documentation library; and
- (H) demonstrate best practices in understanding and applying Information Security.

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Technology Applications, Web Commerce (1 Credit High School)

- (a) General requirements. This is an introductory course in the knowledge and skills described in this title. This course is recommended for Students in Grades 11-12. Prerequisites: Web Design and Development.
- (b) Introduction.
 - (1) The technology applications curriculum has six strands: Divergent Thinking, Global Interaction, Information Acquisition and Analysis, Critical Thinking, Problem Solving and Decision Making, Digital Citizenship, and Technology Operations and Concepts.
 - (2) The integration of the global society and its exchange of information through innovative and diverse mediums that require the effective communication of multiple data elements, to display use of high quality and complex media that is created with the dynamic end user expectations. These adaptations drive the creation of new tools to allow students a selection process of powerful and effective ways through social communication that promotes their competitive development. Therefore, as we focus our insightful vision to the future, students are presented with courses that follow various challenges and changing trends in their productive capacity.
- (c) Knowledge and skills.
 - (1) Divergent Thinking. Students think creatively, build knowledge, and augment innovative products and processes using technology. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. The student is expected to:
 - (A) research and evaluate emerging technologies;
 - (B) research existing markets to identify potential sales, analyze demand, and make other decisions; and
 - (C) research, evaluate, and demonstrate the appropriate design of a website for ecommerce.
 - (2) Global Interaction. Students learn to use digital technology to collaboratively work towards their own individual learning and towards the learning of others. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. The student is expected to:
 - (A) understand and evaluate the use and appropriateness of webinars;
 - (B) examine, discuss, and summarize online learning environments;
 - (C) distinguish between distance learning, virtual learning, and online learning;
 - (D) research existing ecommerce websites to determine local, state, national, and global trends;
 - (E) identify and apply end user, peer, self and professional evaluation;
 - (F) work collaboratively to create functioning ecommerce websites; and
 - (G) research and identify existing online tools that aid in the creation of ecommerce websites and allow those sites to be marketed.

- (3) Information Acquisition and Analysis. Students conduct effective research to gather, assess and apply their acquired knowledge. Students apply digital tools to gather, evaluate, and use information. The student is expected to:
- (A) research, evaluate, and create web forms for data/database processing;
 - (B) differentiate between the available web programming languages;
 - (C) compare and contrast programming languages;
 - (D) research, evaluate, and summarize content management system (CMS), including management of dynamic web calendars;
 - (E) compare and contrast Common Gateway Interface (CGI) and computer-generated imagery (CGI);
 - (F) discuss, analyze, and summarize streaming;
 - (G) define and evaluate Instant Messaging (IM);
 - (H) examine the laws and regulations that impact ecommerce websites;
 - (I) research and evaluate industries to determine the appropriateness of an ecommerce website;
 - (J) analyze current pricing policies and trends to determine appropriate prices, markups, and discounts to maximize return;
 - (K) compare and contrast web standards versus browser specific languages;
 - (L) identify the components of effective promotion; such as advertising, visual merchandising, personal selling;
 - (J) research, evaluate, and summarize e-commerce;
 - (K) identify distribution channels that effectively distribute ecommerce products;
 - (L) identify a business plan and explain its importance;
 - (M) identify a legal plan and explain its importance;
 - (N) identify accounting functions and terms, including asset, cash, inventory, liability, account payable, liquid, account receivable, debt, equity, profit and loss statement, revenue, expense, budget, inventory, and credit;
 - (O) identify data mining;
 - (P) identify the various types of ecommerce;
 - (Q) identify the start-up requirements for a business;
 - (R) delineate the steps required to secure a business name;
 - (S) describe the necessary process to secure the elements to place an ecommerce website on the Internet, including: uniform resource locator (URL), site hosting, bandwidth, server space, email accounts;
 - (T) discuss the advantages and disadvantages of specialization; and
 - (U) identify payment options for websites.
- (4) Critical Thinking, Problem Solving and Decision Making. Students problem solve, think critically and make a variety of decisions using suitable digital technology. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and

make informed decisions using appropriate digital tools and resources. The student is expected to:

- (A) choose an appropriate programming language based on a given criteria;
 - (B) develop requirements for a database and determine the appropriate means to insert, delete, and modify records;
 - (C) develop structured query language (SQL) statements to retrieve, insert, modify and delete records in a database;
 - (D) design and create a flowchart to plan a database and a website;
 - (E) identify the appropriate target audience for web-based marketing taking into account current marketing trends, availability of product, price, advertising, culture, distribution, financial limitations, buying habits;
 - (F) evaluate financial resources to determine monetary availability to allow implementation of ecommerce website;
 - (G) demonstrates a knowledge of the history of ecommerce;
 - (H) identify the impact of advertising on the success and failure of ecommerce websites;
 - (I) make forecasts about the future of ecommerce based on current marketing trends;
 - (J) design and create decision trees for an ecommerce website's customer relations;
 - (K) develop an effective promotional plan;
 - (L) identify similarities and differences between platforms, including: application of coding on a personal computer and mobile device;
 - (M) identify business risk and explain methods to minimize it;
 - (N) use correct grammar, punctuation, and terminology to write and edit documents;
 - (O) choose a product/service delivery method that most effectively meets the needs of the consumer while keeping costs to a minimum;
 - (P) examine the characteristics of the free enterprise system as it relates to profit taking, public and private ownership, limited government involvement, market competition, consumer choice, and price competition;
 - (Q) identify and examine the various managerial and employee roles within a business;
 - (R) incorporate a plan for the expansion of an ecommerce website that takes into account new employees, additional equipment, expanded web presence, growth in advertising and revenues; and
 - (S) analyze existing ecommerce websites to identify current marketing, design, structure, advertising, and payment trends.
- (5) Digital Citizenship. Students understand and participate in relevant and meaningful activities in the community and society while following societal norms, ethics, and laws. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. The student is expected to:
- (A) prepare and conduct formal and informal presentations to provide information to specific audiences that sustain listener attention;

- (B) assess the impact of ecommerce on societal interactions;
 - (C) explain how demographics influences the creation and delivery of ecommerce websites;
 - (D) evaluate and implement the legal and ethical use of copyright and fair-use;
 - (E) define and implement the acquisition, sharing, and use of files taking into consideration their primary ownership and copyright;
 - (F) model ethical and legal acquisition of digital information following guidelines in student code of conduct identifying plagiarism and copyright laws;
 - (G) self monitor original work to follow appropriate behavioral, communication, and privacy guidelines; including: ethics, cyber bullying, personal security, verbiage determined by intended audience, ethical use of files/file sharing, technical documentation; and
 - (H) identify the advantages and disadvantages doing business on the Internet.
- (6) Technology Operations and Concepts. Students show a solid comprehension of technology. Students demonstrate a sound understanding of technology concepts, systems, and operations. The student is expected to:
- (A) create ecommerce website(s) that includes:
 - (i) dynamically created calendar;
 - (ii) interactive database;
 - (iii) Structured Query Language (SQL) statements;
 - (iv) eXtensible Markup Language (XML);
 - (v) Open Database Connectivity (ODBC);
 - (vi) javascript;
 - (vii) server-side processing language;
 - (viii) programming framework, such as: framework model or object oriented programming (OOP);
 - (ix) server side includes;
 - (x) Common Gateway Interface (CGI);
 - (xi) creation and maintenance of inventory systems;
 - (xii) bitmap and vector graphics;
 - (xiii) database creation, modification, deletion;
 - (xiv) creation and maintenance of user accounts;
 - (xv) password access;
 - (xvi) user authentication;
 - (xvii) documentation; and
 - (xviii) customer payment.
 - (B) develop a financial plan that includes: identification of sources of financial assistance, budget, balance sheet, and income statement;

- (C) include user specific advertising;
- (D) develop a customer feedback system;
- (E) create and troubleshoot an online ordering system; and
- (F) implement code necessary to ensure search engine optimization.

DRAFT

Technology Applications, Web Communications (1/2 Credit Middle School; 1/2 Credit High School)

- (a) General requirements. This is an introductory course in the knowledge and skills described in of this title relating to Technology Applications, Grades 6-8. This course is recommended for Students in Grades 8-9.
- (b) Introduction.
- (1) The technology applications curriculum has six strands: Divergent Thinking, Global Interaction, Information Acquisition and Analysis, Critical Thinking, Problem Solving and Decision Making, Digital Citizenship, and Technology Operations and Concepts.
 - (2) The integration of the global society and its exchange of information through innovative and diverse mediums that require the effective communication of multiple data elements, to display use of high quality and complex media that is created with the dynamic end user expectations. These adaptations drive the creation of new tools to allow students a selection process of powerful and effective ways through social communication that promotes their competitive development. Therefore, as we focus our insightful vision to the future, students are presented with courses that follow various challenges and changing trends in their productive capacity.
- (c) Knowledge and Skills.
- (1) Divergent Thinking. Students think creatively, build knowledge, and augment innovative products and processes using technology. The student is expected to:
 - (A) demonstrate proficiency local and online collaboration;
 - (B) create website using web editors or web authoring programs;
 - (C) evaluate accessibility and usability of original website; and
 - (D) predict, use, and develop new possible technologies.
 - (2) Global Interaction. Students learn to use digital technology to collaboratively work towards their own individual learning and towards the learning of others. The student is expected to:
 - (A) analyze the proper and acceptable use of Digital/Virtual Communications Technologies, such as IM, Chat, Email, and Social Networking;
 - (B) implement proper and acceptable use of Digital/Virtual Communications Technologies, such as: IM, Chat, Email, and Social Networking;
 - (C) define and implement the acquisition, sharing, and use of files taking into consideration their primary ownership and copyright;
 - (D) make decisions regarding the selection, acquisition, and sharing of Reference Site URL's taking into consideration their quality, appropriateness, and effectiveness; and
 - (E) solve problems using critical thinking strategies.
 - (3) Information Acquisition and Analysis. Students conduct effective research to gather, assess and apply their acquired knowledge. The student is expected to:
 - (A) verify the accuracy, validity and currency of acquired information;
 - (B) conduct Boolean search strings to conduct effective searches;

- (C) acquire and use appropriate vocabulary terms;
 - (D) appropriately cite sources using established methods;
 - (E) model ethical and legal acquisition of digital information following guidelines in student code of conduct identifying plagiarism and copyright laws;
 - (F) identify and discuss emerging technologies and their impact;
 - (G) understand the Internet history and Internet structure as they frame what we do currently and how it will influence the future; and
 - (H) demonstrate appropriate use of grammar, spelling, vocabulary to create original work.
- (4) Critical Thinking, Problem Solving and Decision Making. Students problem solve, think critically and make a variety of decisions using suitable digital technology. The student is expected to:
- (A) demonstrate the transfer and adaptation of knowledge through the creation of original work;
 - (B) evaluate and implement security measures to protect original work, such as firewall, site, and Internet;
 - (C) analyze and follow timelines needed to create, edit, and present original work;
 - (D) verify current licensing issues for software being used for the creations of original work.
 - (E) identify and evaluate the design and functionality of web pages using Rubrics;
 - (F) create web documents to be delivered as quickly and efficiently for various target audiences or users, such as dial-up, high speed Internet, and mobile devices; and
 - (G) evaluate original work through self, peer, professional review of website.
- (5) Digital Citizenship. Students understand and participate in relevant and meaningful activities in the community and society while following societal norms, ethics, and laws. The student is expected to:
- (A) engaging in online activities that follow appropriate behavioral, communication, and privacy guidelines; including: ethics, cyber bullying, personal security, verbiage determined by intended audience;
 - (B) implement personal security guidelines, including identity protection, limited personal information sharing, and password protection; and
 - (C) advocate and practice safe, legal, and responsible use of information and technology.
- (6) Technology Operations and Concepts. Students show a solid comprehension of technology. The student is expected to:
- (A) demonstrate knowledge of hardware, such as scanners, cameras, printers, and video cameras;
 - (B) identify the parts of a computer and explain its functions;
 - (C) summarize the need, functionality, and use of servers;

- (D) differentiate the advantages and disadvantages of running a personal server versus using a server provider;
- (E) compare, contrast, and use appropriately the various input, processing, output, and primary/secondary storage devices;
- (F) create and implement universally accessible documents;
- (G) analyze bandwidth issues as it relates to audience, server, connectivity, and cost;
- (H) establish a folder/directory hierarchy for storage of a web page and its related or linked files;
- (I) create naming schemes to follow established guidelines, such as spacing, special characters, and capitalization; and
- (J) identify basic design principles when creating a website.

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Technology Applications, Web Design and Development (1 Credit High School)

(a) General requirements. This is an introductory course in the knowledge and skills described in of this title. This course is recommended for Students in Grades 10-12.

(b) Introduction.

- (1) The technology applications curriculum has six strands: Divergent Thinking, Global Interaction, Information Acquisition and Analysis, Critical Thinking, Problem Solving and Decision Making, Digital Citizenship, and Technology Operations and Concepts.
- (2) The integration of the global society and its exchange of information through innovative and diverse mediums that require the effective communication of multiple data elements, to display use of high quality and complex media that is created with the dynamic end user expectations. These adaptations drive the creation of new tools to allow students a selection process of powerful and effective ways through social communication that promotes their competitive development. Therefore, as we focus our insightful vision to the future, students are presented with courses that follow various challenges and changing trends in their productive capacity.

(c) Knowledge and skills.

- (1) Divergent Thinking. Students think creatively, build knowledge, and augment innovative products and processes using technology. The student is expected to:
 - (A) demonstrate proficiency local and online collaboration;
 - (B) create website using web editors or web authoring programs;
 - (C) evaluate accessibility and usability of original website;
 - (D) predict, use, and develop new possible technologies;
 - (E) demonstrate the use of virtualization, such as Virtual Classroom, Distance Learning, Virtual Storage, and Virtual Operating System;
 - (F) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components; and
 - (G) make decisions regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency.
- (2) Global Interaction. Students learn to use digital technology to collaboratively work towards their own individual learning and towards the learning of others. The student is expected to:
 - (A) analyze the proper and acceptable use of Digital/Virtual Communications Technologies, such as IM, Chat, Email, and Social Networking;
 - (B) implement proper and acceptable use of Digital/Virtual Communications Technologies, such as IM, Chat, Email, and Social Networking;
 - (C) define and implement the acquisition, sharing, and use of files taking into consideration their primary ownership and copyright;
 - (D) apply decisions regarding the selection, acquisition, and sharing of Reference Site Uniform Resource Locators (URLs) taking into consideration their quality, appropriateness, and effectiveness;
 - (E) solve problems using critical thinking strategies; and

- (F) compare, evaluate, and implement the use of wired versus wireless access.
- (3) Information Acquisition and Analysis. Students conduct effective research to gather, assess and apply their acquired knowledge. The student is expected to:
 - (A) verify the accuracy, validity and currency of acquired information;
 - (B) conduct Boolean search strings to conduct effective searches;
 - (C) acquire and use appropriate vocabulary terms;
 - (D) appropriately cite sources using established methods;
 - (E) model ethical and legal acquisition of digital information following guidelines in student code of conduct identifying plagiarism and copyright laws;
 - (F) identify and discuss emerging technologies and their impact;
 - (G) understand the Internet history and Internet structure as they frame what we do currently and how it will influence the future;
 - (H) demonstrate appropriate use of grammar, spelling, vocabulary to create original work;
 - (I) acquire, evaluate, and use various web organization standards to make informed decisions to implement said standards in original work. (such as: World Wide Web Consortium (W3C), ECMA International, Internet Corporation for Assigned Names and Numbers (ICANN));
 - (J) understand, analyze and use interactive websites;
 - (K) understand, evaluate, and determine the appropriate use of dynamic and static websites;
 - (L) understand, evaluate, and determine the appropriate use for open/closed source file formats and software;
 - (M) explain and demonstrate the function of how search engines work, such as: advanced options, preferences, advertising, search categories;
 - (N) evaluate, create, and apply principles of project management, including: web storyboard, site map, job duties, time constraints, group dynamics, communication interaction, project completion, evaluation/feedback;
 - (O) understand the use and application of a Virtual Private Network (VPN);
 - (P) distinguish among protocols including HyperText Transfer Protocol (http) and File Transfer Protocol (ftp);
 - (Q) summarize the technical needs of a World Wide Web (WWW) server including Random Access Memory (RAM), hard disk capacity, Central Processing Unit (CPU) speed, methods of connectivity, and appropriate software;
 - (R) demonstrate proficiency in the use of a variety of electronic input devices such as keyboard, scanner, voice/sound recorder, mouse, touch screen or digital video by incorporating such components while publishing WWW pages;
 - (S) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet;

- (T) demonstrate proficiency in, appropriate use of, and navigation of local area networks (LANs), wide area networks (WANs), the Internet, and intranets for research and for resource sharing;
 - (U) construct appropriate search strategies in the acquisition of information from the Internet including keyword and Boolean search strategies; and
 - (V) acquire information in electronic formats including text, audio, video, and graphics, citing the source.
- (4) Critical Thinking, Problem Solving and Decision Making. Students problem solve, think critically and make a variety of decisions using suitable digital technology. The student is expected to:
- (A) demonstrate the transfer and adaptation of knowledge through the creation of original work;
 - (B) evaluate and implement security measures to protect original work, such as firewall, site, and Internet;
 - (C) analyze and follow timelines needed to create, edit, and present original work;
 - (D) verify current licensing issues for software being used for the creations of original work.
 - (E) identify and evaluate the design and functionality of web pages using Rubrics;
 - (F) create web documents to be delivered as quickly and efficiently for various target audiences or users, such as dial-up, high speed Internet, and mobile devices;
 - (G) evaluate original work through self, peer, professional review of website;
 - (H) evaluate the types, the function, and the target audience of websites;
 - (I) read, use, and develop technical documents;
 - (J) analyze, examine, assess, and decide upon servers as they relate to management of a website;
 - (K) analyze, examine, assess and decide on a web host, domain name acquisition and retention, and maintenance;
 - (L) evaluate the functionality of a website as it relates to intended audience, such as color scheme, grammar, technological constraints, age appropriateness, cross platform usability, and user relevant criteria;
 - (M) identify software file formats, their characteristics, and appropriate use;
 - (N) identify and apply Search Engine Optimization (SEO) to ensure optimal website visibility;
 - (O) investigate and choose electronic security methods for a web server to protect from unauthorized access and negative intentions; and
 - (P) synthesize and generate new information from data gathered from electronic and telecommunications resources.
- (5) Digital Citizenship. Students understand and participate in relevant and meaningful activities in the community and society while following societal norms, ethics, and laws. The student is expected to:

- (A) engaging in online activities that follow appropriate behavioral, communication, and privacy guidelines; including: ethics, cyber bullying, personal security, verbiage determined by intended audience;
 - (B) implement personal security guidelines, including identity protection, limited personal information sharing, and password protection;
 - (C) engage in safe, legal, and responsible use of information and technology;
 - (D) understand and respond to local, national, and global issues to ensure appropriate cross browser and cross platform usability;
 - (E) interpret, use, and develop a safe, collaborative cloud computing environment;
 - (F) identify legal, ethical, appropriate and safe marketing practices;
 - (G) identify legal, ethical, appropriate, and safe multimedia usage, including video, audio, graphics, animation, and emerging trends;
 - (H) analyze the impact of the WWW on society through research, interviews, and personal observation; and
 - (I) participate in relevant, meaningful activities in the larger community and society to create electronic projects.
- (6) Technology Operations and Concepts. Students show a solid comprehension of technology. The student is expected to:
- (A) demonstrate knowledge of hardware, such as scanners, cameras, printers, and video cameras;
 - (B) identify the parts of a computer and explain its functions;
 - (C) summarize the need, functionality, and use of servers;
 - (D) differentiate the advantages and disadvantages of running a personal server versus using a server provider;
 - (E) differentiate and use appropriately the various input, processing, output, and primary/secondary storage devices;
 - (F) create and implement universally accessible documents;
 - (G) analyze bandwidth issues as it relates to audience, server, connectivity, and cost;
 - (H) establish a folder/directory hierarchy for storage of a web page and its related or linked files;
 - (I) create naming schemes to follow established guidelines, including: spacing, special characters, capitalization;
 - (J) identify basic design principles when creating a website, including white space, color theory, background color, shape, line, proximity, unity, balance (ratio of text to white space), alignment, typography, font size, type, style, image file size, repetition, contrast, consistency, and aestheticism;
 - (K) demonstrate knowledge of the six core domains (gov, net, com, mil, org, edu.) and be familiar with new trends;
 - (L) implement embed codes, html, css, and javascript through hard coding, web editors, and web authoring programs;

- (M) identify and use file transfer protocol (ftp) clients;
- (N) implement java applet insertion;
- (O) identify and differentiate various network topologies including physical and logical;
- (P) create, evaluate, and use web based animation and gaming;
- (Q) create, evaluate, and use video including appropriateness, editing, compression, exporting, and delivery;
- (R) demonstrate the ability to conduct secure transactions from the web server to the client; and
- (S) use hypertext linking appropriately when creating WWW pages.

DRAFT

Technology Applications, Web Programming and Gaming (1 Credit High School)

- (a) General requirements. This is an introductory course in the knowledge and skills described in of this title. This course is recommended for Students in Grades 11-12. Prerequisites: Web Design and Development and Algebra II
- (b) Introduction.
- (1) The technology applications curriculum has six strands: Divergent Thinking, Global Interaction, Information Acquisition and Analysis, Critical Thinking, Problem Solving and Decision Making, Digital Citizenship, and Technology Operations and Concepts.
 - (2) The integration of the global society and its exchange of information through innovative and diverse mediums that require the effective communication of multiple data elements, to display use of high quality and complex media that is created with the dynamic end user expectations. These adaptations drive the creation of new tools to allow students a selection process of powerful and effective ways through social communication that promotes their competitive development. Therefore, as we focus our insightful vision to the future, students are presented with courses that follow various challenges and changing trends in their productive capacity.
- (c) Knowledge and skills.
- (1) Divergent Thinking. Students think creatively, build knowledge, and augment innovative products and processes using technology. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. The student is expected to:
 - (A) research and evaluate emerging technologies;
 - (B) research and evaluate augmented reality. The supplementing of reality with computer generated imagery, such as Head's Up Display, Virtual Digital Projectors;
 - (C) research, evaluate and demonstrate the appropriate design of a website for gaming.
 - (2) Global Interaction. Students learn to use digital technology to collaboratively work towards their own individual learning and towards the learning of others. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. The student is expected to:
 - (A) understand and evaluate the use and appropriateness of webinars;
 - (B) examine, discuss, and summarize online learning environments;
 - (C) distinguish between distance learning, virtual learning, and online learning;
 - (D) define and evaluate Voice over Internet Protocol (VoIP);
 - (E) identify and apply end user, peer, self and professional evaluation; and
 - (F) work collaboratively to create functioning programs and gaming products.
 - (3) Information Acquisition and Analysis - Students conduct effective research to gather, assess and apply their acquired knowledge. Students apply digital tools to gather, evaluate, and use information. The student is expected to:
 - (A) research, evaluate, and create web forms for data/database processing;
 - (B) differentiate between the available web programming languages;

- (C) compare and contrast programming languages;
 - (D) research, evaluate and summarize content management system (CMS), including: management of dynamic web calendars;
 - (E) compare and contrast Common Gateway Interface (CGI) and computer-generated imagery (CGI);
 - (F) discuss, analyze and summarize streaming;
 - (G) define and evaluate Instant Messaging (IM);
 - (H) analyze and discuss the history of gaming;
 - (I) discuss, analyze, compare and contrast the type of games (such as but not limited to: action, action-adventure, adventure, construction and management simulation, life simulation, massively multiplayer online role-playing game (MMORPG), music, party, puzzle, role playing, sports, strategy, trivia, and vehicle simulation);
 - (J) discuss, analyze, compare and contrast gaming hardware, such as console, PC, mobile and Web;
 - (K) compare and contrast web standards versus browser specific languages;
 - (L) discuss, analyze and summarize game broadcasting;
 - (M) research, evaluate, and summarize e-commerce;
 - (N) investigate career opportunities in the following fields: programming, gaming, art, design, and business;
 - (O) research the characteristics of existing gaming websites to determine local, state, national, and global trends; and
 - (P) compare and contrast historical and contemporary styles of game development.
- (4) Critical Thinking, Problem Solving and Decision Making. Students problem solve, think critically and make a variety of decisions using suitable digital technology. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. The student is expected to:
- (A) will choose an appropriate programming language based on a given criteria;
 - (B) will develop requirements for a database and determine the appropriate means to insert, delete, and modify records;
 - (C) develop structured query language (SQL) statements to retrieve, insert, modify and delete records in a database;
 - (D) design and create a flowchart to plan a database, a program, a game;
 - (E) define and identify proper use of gaming graphics, including: skins, textures, environment appearance, environment mapping, raster graphics, and vector graphics;
 - (F) plan an animation, including: the movement of characters, camera movements, camera angles, user point of view, mechanics of motion, backgrounds, settings, ambient objects, environment;
 - (G) compare and contrast two-dimensional (2-D) and three-dimensional (3-D) animation;

- (H) develop and create a gaming storyboard that shows the overall development of the storyline;
 - (I) identify and implement graphic and game design elements, including: color, environment, time to completion, difficulty, story complexity, character development, device control, backstory, delivery, single-player, multi-player, and online multi and single player;
 - (J) design and create decision trees for a game's artificial intelligence engine;
 - (K) compare and contrast available audio formats;
 - (L) identify similarities and differences between platforms, including: application of coding on a personal computer, mobile device, gaming console;
 - (M) research and identify existing online game development tools;
 - (N) evaluate and determine network requirements for delivery of online games to end-users; and
 - (O) evaluate and justify the decisions used to create original portfolios, games, programs, and websites to form perspectives about historical and cultural contexts, intents, meanings, qualities, technical elements, creation timeline, and conforming to trends.
- (5) Digital Citizenship. Students understand and participate in relevant and meaningful activities in the community and society while following societal norms, ethics, and laws. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. The student is expected to:
- (A) explain and understand game ratings and why games fit into certain ratings;
 - (B) assess game ratings and how they impact societal interactions;
 - (C) evaluate how games impact social interactions;
 - (D) evaluate and implement the legal and ethical use of copyright and fair-use;
 - (E) define and implement the acquisition, sharing, and use of files taking into consideration their primary ownership and copyright;
 - (F) model ethical and legal acquisition of digital information following guidelines in student code of conduct identifying plagiarism and copyright laws; and
 - (G) self monitor original work to follow appropriate behavioral, communication, and privacy guidelines: including: ethics, cyber bullying, personal security, verbiage determined by intended audience, ethical use of files/file sharing, technical documentation.
- (6) Technology Operations and Concepts - Students show a solid comprehension of technology. Students demonstrate a sound understanding of technology concepts, systems, and operations. The student is expected to:
- (A) create website(s) that includes:
 - (i) dynamically created calendar;
 - (ii) interactive database;
 - (iii) Structured Query Language (SQL) statements;
 - (iv) eXtensible Markup Language (XML);

- (v) Open Database Connectivity (ODBC);
 - (vi) javascript;
 - (vii) server-side processing language;
 - (viii) programming framework, such as: framework model or object oriented programming (OOP);
 - (ix) server side includes;
 - (x) Common Gateway Interface (CGI);
 - (xi) Computer-generated imagery (CGI);
 - (xii) bitmap and vector graphics;
 - (xiii) database creation, modification, deletion;
 - (xiv) creation and maintenance of user accounts;
 - (xv) password access;
 - (xvi) user authentication;
 - (xvii) documentation.
- (B) create a fully functional online game that includes:
- (i) multiple game levels;
 - (ii) high score ranking;
 - (iii) increasing complexity;
 - (iv) physics, including: center of mass, collision detection, lighting, shading, perspective, anatomy, motion blur, lens flare, reflections;
 - (v) art, including: color theory, texture, balance, lighting, shading, skinning, drawing;
 - (vi) graphics resolution, including: pixel depth, compression;
 - (vii) database creation, modification, deletion;
 - (viii) creation and maintenance of user accounts;
 - (ix) password access;
 - (x) user authentication;
 - (xi) artificial intelligence;
 - (xii) game level saving;
 - (xiii) mathematics, such as: algebra, geometry, linear algebra, logic, discrete mathematics;
 - (xiv) varying camera angles;
 - (xv) Voice over Internet Protocol (VoIP) for online web game; and
 - (xvi) documentation.
- (C) create a portfolio.

126.27. Video Technology (One Credit)

~~(a) General requirements. The prerequisite for this course is proficiency in the knowledge and skills described in §126.12(c) of this title (relating to Technology Applications (Computer Literacy), Grades 6-8). This course is recommended for students in Grades 9-12.~~

(a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Business Information Management I, Principles of Arts, Audio/Video Technology, Multimedia, and Communications.

~~(b) Introduction.~~

(b) Students will gain knowledge and experience as 21st century digital age critical thinkers, problem-solvers, collaborators, and innovators. The hands-on experience will prepare students with the skills, knowledge and expertise to be successful in college, the workforce, or the global learning communities. Students will work in a digital culture or environment to develop video resources and online projects such as cellular media, gaming, virtual reality and other on-demand informational products. The technology applications curriculum has five standards, Cyber Ethics, Collaborative Interaction, Technological Design, Digital Research Development, and Innovative Cognition.

~~(1) The technology applications curriculum has four strands: foundations, information acquisition, work in solving problems, and communication.~~

~~(2) Through the study of technology applications foundations, including technology related terms, concepts, and data input strategies, students learn to make informed decisions about technologies and their applications. The efficient acquisition of information includes the identification of task requirements; the plan for using search strategies; and the use of technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create a solution, and evaluate the results. Students communicate information in different formats and to diverse audiences. A variety of technologies will be used. Students will analyze and evaluate the results.~~

(c) Knowledge and skills.

~~(1) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to:~~

~~(A) demonstrate knowledge and appropriate use of digital and analog video systems, software applications, and communication and networking components;~~

~~(B) compare, contrast, and appropriately use the various input, processing, output, and primary/secondary storage devices;~~

~~(C) make decisions regarding the selection, acquisition, and use of software taking under consideration its quality, appropriateness, effectiveness, and efficiency;~~

~~(D) delineate and make necessary adjustments regarding compatibility issues including, but not limited to, digital file formats and cross platform connectivity;~~

~~(E) use vocabulary related to video technology; and~~

(1) Cyber Ethics. The student applies ethical decision making and complies with laws regarding use of technology in audio and video production. The student is expected to:

(A) exhibit ethical conduct related to interacting with others and provide proper credit for ideas;

Comment [A164]: We wanted to make sure the students take BIM 1 before taking Video Technology because we feel the skills learned in BIM 1 is an important foundation for this course.

Comment [A165]: Our goal was to update the strands to align with CRS, VA, and MV

Comment [A166]: Updated terminology in this section. CRS & 21st

Comment [A167]: Deleted this section because we felt like the terminology was dated. We updated the terminology and moved it to a different section.

- (B) discuss and apply copyright laws in relation to fair use and acquisition;
- (C) model respect of intellectual property; and
- (D) analyze the ethical impact of the audio and video production industry on society.
- ~~(2) Foundations. The student uses data input skills appropriate to the task. The student is expected to:~~
 - ~~(A) outline differences among electronic input devices as related to video technology; and~~
 - ~~(B) demonstrate proficiency in the use of a variety of electronic input devices including the keyboard, mouse, disk/disc, modem, scanner, voice/sound recorder, and digital video by incorporating such components into the video-related product.~~
- (2) Cyber Ethics. The student applies safety regulations. The student is expected to:
 - (A) implement personal and workplace safety rules and regulations;
 - (B) follow emergency procedures; and
 - (C) examine and summarize safety-related problems that may result from working with electrical circuits.
- ~~(3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:~~
 - ~~(A) discuss copyright laws/issues and model ethical acquisition and use of digital and video information, citing sources using established methods;~~
 - ~~(B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet; and~~
 - ~~(C) analyze the impact of video technology on society.~~
- (3) Innovative Cognition. The student applies academic knowledge and skills in audio and video projects. The student is expected to:
 - (A) apply English language arts knowledge and skills by demonstrating use of content, technical concepts, and vocabulary; using correct grammar, punctuation, and terminology to write and edit documents; and composing and editing copy for a variety of written documents such as scripts, captions, schedules, reports, and manuals; and
 - (B) apply mathematics knowledge and skills in invoicing and time-based mathematics by demonstrating knowledge of arithmetic operations and applying measurement to solve problems.
- ~~(4) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to:~~
 - ~~(A) use strategies to access research information from different resources including local area networks (LANs), wide area networks (WANs), the Internet, and intranet; and~~
 - ~~(B) construct and use appropriate electronic search strategies in the acquisition of information including keyword and Boolean search strategies.~~

Comment [A168]: We felt this section was vital because it shows how the students will apply their English, Math & Problem solving skills to video projects.

Comment [A169]: Updated terminology for CRS, 21st, and VA. Some of these terms and strategies are out of date so we updated them and moved them to Digital Research & Development .

(4) Innovative Cognition. The student understands and examines problem-solving methods. The student is expected to employ critical-thinking and interpersonal skills independently and in teams to solve problems.

~~(5) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to:~~

~~(A) acquire information in electronic formats including text, audio, video, and graphics, citing the source;~~

~~(B) engage in preproduction planning by surveying the site and obtaining necessary permits and release forms; and~~

~~(C) acquire information from on line help and other forms of documentation.~~

(5) Innovative Cognition. The student applies information technology applications. The student is expected to use personal information management, email, Internet, writing and publishing, presentation, and spreadsheet or database applications for audio/video production projects.

~~(6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:~~

~~(A) identify and employ a method to evaluate the information; and~~

~~(B) demonstrate skill in testing the accuracy and validity of the information.~~

(6) Innovative Cognition. The student understands design systems. The student is expected to analyze and summarize the history and evolution of the audio and video production fields.

~~(7) Solving problems. The student uses appropriate computer based productivity tools to create and modify solutions to problems. The student is expected to:~~

~~(A) use foundation and enrichment curricula in the development of video and digital products;~~

~~(B) integrate productivity tools including, but not limited to, video editor, sound editor, word processor, database, spreadsheet, telecommunications, draw, paint, and utility programs to develop and modify solutions to problems for video productions;~~

~~(C) create video technology products for a variety of purposes and audiences; and~~

~~(D) develop technical documentation related to video technology.~~

(7) Collaborative Interaction. The student understands professional communications strategies. The student is expected to:

(A) adapt language for audience, purpose, situation, and intent such as structure and style;

(B) organize oral and written information;

(C) interpret and communicate information, data, and observations;

(D) present formal and informal presentations;

(E) apply active listening skills;

(F) listen to and speak with diverse individuals; and

Comment [A170]: Updated and moved to Digital Research & Development and Technological Design. CR C3 6-8 & CR D-3

Comment [A171]: The sections meets CRS, VA, and 21st standards.

(G) exhibit public relations skills.

- (8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (A) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor;
 - (B) demonstrate proficiency in, appropriate use of, and navigation of LANs and WANs, the Internet, and intranet for research and for sharing of resources;
 - (C) participate in relevant activities in the larger community and society to create electronic projects;
 - (D) extend the learning environment beyond the school walls through the creation and sharing of digital and video products via electronic networks;
 - (E) demonstrate knowledge in composition including ratio of image to frame, position in frame, line of gaze, pan/tilts, movement, and perspective;
 - (F) demonstrate proficiency in basic camera techniques including zoom, focus, iris control, white balance, and filters;
 - (G) create visual communication by applying the strategies of script writing;
 - (H) engage in preproduction activities including storyboarding, script writing, production, contracting, and scheduling;
 - (I) utilize lighting techniques including key, fill, and backlight, using incident/reflected light, color temperatures, and filter use;
 - (J) use audio techniques, including microphone variances and audio mixers, and edit and integrate digital sounds;
 - (K) participate in different roles and jobs of a production crew including executive producer, producer, director, engineer, script writer, editor, camera person, presenters, and audio technicians;
 - (L) apply appropriate post production techniques including editing and creating control and/or time coded tracks, transitions, audio levels, background music, and special sound effects;
 - (M) apply 2-D and 3-D animation effects to video;
 - (N) use character generators, fonts, colors, and principles of compositions to create graphic images;
 - (O) create captions and/or titles for video and graphics;
 - (P) use different compression techniques, and/or programs; and
 - (Q) demonstrate knowledge in outputting digital video to analog and analog video to digital.

(8) Collaborative Interaction. The student understands and examines problem-solving methods. The student is expected to employ critical-thinking and interpersonal skills independently and in teams to solve problems. The student develops leadership characteristics. The student is expected to:

- (A) employ leadership skills;
- (B) employ teamwork and conflict-management skills;

- (C) conduct and participate in meetings; and
- (D) employ mentoring skills.
- ~~(9) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to:~~
 - ~~(A) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product;~~
 - ~~(B) seek and respond to advice from peers and professionals in delineating technological tasks;~~
 - ~~(C) create technology specifications for tasks and evaluation rubrics;~~
 - ~~(D) resolve information conflicts and validate information by accessing, researching, and comparing data; and~~
 - ~~(E) monitor process and product quality using established criteria.~~
- (9) Collaborative Interaction. The student develops employability characteristics. The student is expected to:
 - (A) identify and participate in training, education, or certification required for employment;
 - (B) identify and demonstrate positive work behaviors and personal qualities needed to be employable;
 - (C) demonstrate skills related to seeking and applying for employment;
 - (D) develop a resumé and letter of application;
 - (E) create a career portfolio to document work experiences, licenses, certifications, and work samples;
 - (F) demonstrate skills in evaluating and comparing employment opportunities; and
 - (G) examine employment opportunities in entrepreneurship.
- ~~(10) Communication. The student formats digital information for appropriate and effective communication. The student is expected to:~~
 - ~~(A) use font attributes and color to ensure that products are appropriate for the defined audience and communication purpose;~~
 - ~~(B) use white space and graphics to ensure that products are appropriate for the defined audience and communication purpose;~~
 - ~~(C) use camera perspective to ensure that products are appropriate for the defined audience and communication purpose; and~~
 - ~~(D) use content selection and presentation to ensure that products are appropriate for the defined audience and communication purpose.~~
- (10) Digital Research and Development. The student understands the pre-production process. The student is expected to:
 - (A) identify critical elements in the pre-production stage;

Comment [A172]: CR Problem Solving 1-3. We felt like we needed to be specific on what Collaborative Interaction skills were needed for Video Tech.

Comment [A173]: Updated to 21st trends and specific skills a student would need for CRS or to get a job in the Video industry.

- (B) use technology applications to facilitate pre-production by:
 - (i) designing and implementing procedures to track trends, set timelines, and evaluate progress for continual improvement in process and product;
 - (ii) responding to advice from peers and professionals;
 - (iii) creating technology specifications;
 - (iv) monitoring process and product quality using established criteria;
 - (v) creating a script and identifying resources needed to begin the production; and
 - (vi) identifying budgeting considerations for crew, cast, and equipment;
- (C) analyze the script and storyboard development processes for a successful production;
- (D) identify and participate in the team roles required for completion of a production;
- (E) identify equipment, crew, and cast requirements for a scripted production; and
- (F) understand the casting or audition process.
- (11) Technological Design. The student applies technical skills for efficiency. The student is expected to employ planning and time-management skills to complete work tasks.
- ~~(12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to:~~
 - ~~(A) evaluate the project for design, content delivery, purpose, and audience using established criteria;~~
 - ~~(B) seek and respond to advice from peers and professionals in evaluating the product; and~~
 - ~~(C) research the best method of distribution, number of copies of finished product, and appropriate method for promoting product.~~
- (12) Technological Design. The student develops a basic understanding of audio and video production. The student is expected to:
 - (A) understand the industry, including history, current practice, and future trends by:
 - (i) explaining the beginnings and evolution of audio, video, and film;
 - (ii) describing how the changing technology is impacting the audio, video, and film industries; and
 - (iii) defining terminology associated with the industry.
 - (B) employ knowledge regarding use of audio by:
 - (i) identifying the key elements required in audio scripts;
 - (ii) applying writing skills to develop an audio script;
 - (iii) explaining how various styles of music can create a specific emotional impact;
 - (iv) identifying various audio tape, tapeless, and file formats;

Comment [A174]: Updated to meet new emerging technology. 21st, VA, and CRS

- (v) understanding various microphones based upon type and pickup patterns; and
 - (vi) understanding various audio cables and connectors;
 - (C) employ knowledge regarding use of video by:
 - (i) identifying the key elements required in video scripts;
 - (ii) applying writing skills to develop a video script;
 - (iii) identifying various video tape, tapeless, and file formats;
 - (iv) understanding various video cables and connectors;
 - (v) distinguishing between analog and digital formats;
 - (vi) demonstrating operation of video cameras; and
 - (vii) demonstrating how to properly maintain video equipment;
 - (D) demonstrate various cinematography techniques by:
 - (i) demonstrating how to frame and maintain picture composition;
 - (ii) demonstrating focusing techniques;
 - (iii) demonstrating camera and tripod movements; and
 - (iv) demonstrating proper exposure and white balance; and
 - (E) edit basic audio and video productions by:
 - (i) understanding the differences in linear and nonlinear systems;
 - (ii) demonstrating skills required for editing using linear and nonlinear systems;
 - (iii) employing knowledge of control peripherals for capturing or ingesting media; and
 - (iv) describing various digital platforms, including high definition and standard definition.
 - (13) Technological Design. The student understands the production process. The student is expected to:
 - (A) understand the coherent sequence of events to successfully produce a script;
 - (B) use lighting techniques by:
 - (i) demonstrating three-point lighting, including key, fill, and back lights;
 - (ii) using reflected light;
 - (iii) understanding color temperatures; and
 - (iv) using filters;
 - (C) understand audio techniques, including microphone variances and sound mixing; and
 - (D) demonstrate knowledge of interpersonal skills with sensitivity to diversity when directing crew or talent.

Comment [A175]: Refined and updated the skills needed in the design phase of a project.

(14) Technological Design. The student understands the post-production process. The student is expected to:

- (A) demonstrate appropriate use of hardware components, software programs, and their connections by:
 - (i) demonstrating knowledge of video systems such as digital and analog systems, software applications, and communication and networking components;
 - (ii) using various computer peripherals appropriately;
 - (iii) making appropriate decisions regarding the selection of software; and
 - (iv) making necessary adjustments regarding compatibility issues, including digital file formats and cross-platform connectivity;
- (B) apply animation effects to video by:
 - (i) using character generators, fonts, colors, and principles of compositions to create graphic images; and
 - (ii) creating captions or titles for video and graphics;
- (C) demonstrate proficiency in the use of a variety of electronic input devices;
- (D) use a variety of strategies to acquire information from online resources;
- (E) acquire electronic information in a variety of formats;
- (F) use different compression techniques to output for distribution;
- (G) format digital information for effective communication with a defined audience by:
 - (i) using appropriate font attributes and color;
 - (ii) using appropriate white space and graphics;
 - (iii) using appropriate camera perspective;
 - (iv) using appropriate content selection and presentation; and
 - (v) understanding target audiences and demographics.
- (H) deliver the product in a variety of media by:
 - (i) understanding the various delivery formats such as disk, DVD/Blue-Ray, broadcast, cellular, portable device, electronic, and online delivery;
 - (ii) researching to determine appropriate delivery method based on distribution needs; and
 - (iii) extending the learning environment through digital sharing; collaborative workspace such as blogs and wikis.
- (I) use appropriate computer-based productivity tools to create and modify solutions to problems by:
 - (i) integrating productivity tools;
 - (ii) creating audio and video technology products for a variety of purposes and audiences;

Comment [A176]: Updated to 21st. We felt it was very important for the students to have industry design skills.

- (iii) developing technical documentation related to audio and video technology; and
- (iv) critiquing a production.
- (J) evaluate product/process by:
 - (i) examining the project's success in meeting established criteria such as targeting a specific audience;
 - (ii) creating and preparing an effective presentation to present the product using effective strategies to inform, persuade, or motivate an audience; and
 - (iii) participating in a question and answer session following presentation to evaluate the effectiveness of the presentation.

DRAFT